What is claimed is:

1. A halftone processor for converting a gray scale image comprising a plurality of m-bit pixels to a halftoned image comprising a plurality of n-bit pixel images, where $m > n$, the processor comprising:

a memory storing a stochastic screen, the screen comprising a set of threshold values; and

a comparator receiving the gray scale image and the screen, the comparator comparing, on a pixel-by-pixel basis, a value of each pixel in the gray scale image to a corresponding threshold value in the screen to produce the halftoned image;

wherein substantially all the threshold values corresponding to gray levels between g_{s1} and g_{s2} coincide with black positions in a constraining checkerboard pattern and substantially all the threshold values corresponding to gray levels between g_{s2} and g_{s3} coincide with white positions in the constraining checkerboard pattern.

2. The processor of claim 1, wherein the halftoned image comprises a plurality of 1-bit pixels.

3. The processor of claim 1, wherein the gray level g_{s1} corresponds to approximately a 5% black dither and the gray level g_{s2} corresponds to approximately a 40% black dither.

4. The processor of claim 1, wherein the gray level g_{s2} corresponds to approximately a 40% black dither and the gray level g_{s3} corresponds to approximately a 50% black dither.

5. The processor of claim 1, wherein the gray level g_{s1} corresponds to approximately a 5% black dither, the gray level g_{s2} corresponds to approximately a 40% black dither and the gray level g_{s3} corresponds to approximately a 50% black dither.

6. A method of generating a halftone screen for converting an image received at *d* levels, for reproduction at *c* levels, where $d > c$, the method, in optional sequence, including:

(A) generating an initial screen pattern for a first gray level, the initial screen pattern being designed to provide a visually pleasing, blue noise dot pattern when thresholded and wherein substantially all black pixels in the initial screen pattern correspond to black pixels in a constraining checkerboard pattern;

(B) generating a subsequent screen pattern corresponding to a specific gray level that is darker than the first gray level, the subsequent screen pattern maintaining the arrangement of black pixels of any screen pattern corresponding to a lighter gray level and further including at least one more black pixel, wherein the least one more black pixel is at a location corresponding to a black pixel in the constraining checkerboard pattern;

(C) repeating (B) for a plurality of specific gray levels between the first gray level and a second gray level;

(D) generating a second subsequent screen pattern corresponding to a specific gray level that is darker than the second gray level, the second subsequent screen pattern maintaining the arrangement of black pixels of every screen pattern corresponding to a lighter gray level and further including at least one more black pixel, wherein the least one more black pixel is at a location corresponding to a white pixel in the constraining checkerboard pattern; and

(E) repeating (D) for a plurality of gray levels between the second gray level and a third gray level.

7. The method of claim 6, wherein the first gray level corresponds to approximately a 5% black dither and the second gray level corresponds to approximately a 40% black dither.

8. The method of claim 6, wherein the second gray level corresponds to approximately a 40% black dither and the third gray level corresponds to approximately a 50% black dither.

9. A method for converting a gray scale image received at *d* levels, for reproduction at *c* levels, where $d > c$, the method, in optional sequence, including:

receiving the gray scale image including a plurality of pixels; and

comparing, on a pixel-by-pixel basis, a value of each of the pixels in the gray scale image to a corresponding threshold value in a stochastic screen;

wherein substantially all the threshold values corresponding to gray levels between g_{s1} and g_{s2} coincide with black positions in a constraining checkerboard pattern and substantially all the threshold values corresponding to gray levels between g_{s2} and g_{s3} coincide with white positions in the constraining checkerboard pattern, wherein $g_{s1} \geq g_{s2} \geq g_{s3}$.

10. The method of claim 9, wherein the gray level g_{s1} corresponds to approximately a 5% black dither and the gray level g_{s2} corresponds to approximately a 40% black dither.

11. The processor of claim 9, wherein the gray level g_{s2} corresponds to approximately a 40% black dither and the gray level g_{s3} corresponds to approximately a 50% black dither.